



Customer No. 30223

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application Of: )  
Larry J. Pacey et al. )  
Application No.: 10/657,650 )  
Filed: September 8, 2003 )  
For: Gaming Machine )  
Performing Real- )  
Time 3D Rendering )  
of Gaming Events )

Atty. Docket No.: 47079-00134USPT

Examiner: Michael O'Neill

Group Art Unit: 3713

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on July 25, 2005.

Signature: Jason Gilmore

37 CFR § 1.131 DECLARATION OF LARRY J. PACEY, JASON C. GILMORE, AND  
MICHAEL P. CASEY

COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, VA 22313-1450

We, Larry J. Pacey, Jason C. Gilmore, and Michael P. Cassey, declare that:

1. We are the co-inventors of United States Patent Application No. 10/657,650.
2. WMS Gaming Inc. is the assignee of United States Patent Application No. 10/657,650.
3. We invented the subject matter disclosed and claimed in this patent application at least as early as March 2002.
4. A meeting with Inside Counsel (Michael Blankstein) and Outside Counsel (Zachary Smolinski) regarding the subject matter of the present invention was held in March 2002.
5. We received a first draft of a patent application from Outside Counsel regarding the present invention on April 17, 2002. Exhibit A is the April 17, 2002 email from Outside Counsel forwarding the first draft. Exhibit B is the first draft of the patent application prepared by Outside Counsel sent to us in April 2002.

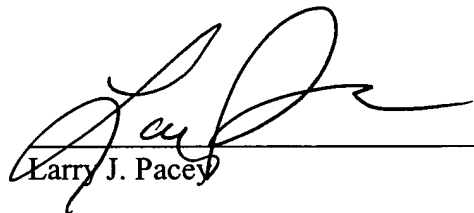
6. Up until the filing date we continued working with Inside Counsel and Outside Counsel on the patent application that resulted in United States Provisional Application No. 60/410,039. As one example, Exhibit C is an email from Inside Counsel to Outside Counsel containing some iterations of the application.

7. In addition to the work on the patent application from March 2002 to the filing date of the Provisional Application of September 12, 2002, we also investigated and refined the technology that is the subject matter of the claimed invention.

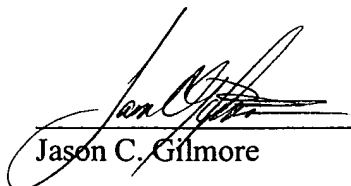
8. Based on these facts, it is clear that we invented the subject matter of the presently claimed invention prior to June 27, 2002, the priority date of the Brosnan et al. reference.

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

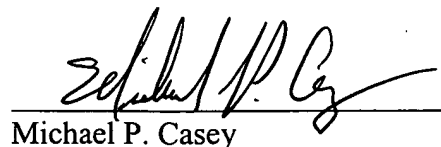
5/31/05  
Date

  
Larry J. Pacey

20 JUNE 2005  
Date

  
Jason C. Gilmore

6/8/05  
Date

  
Michael P. Casey

-----Original Message-----

From: Smolinski, Zachary [mailto:ZSmolinski@jenkens.com]  
Sent: Wednesday, April 17, 2002 9:40 AM  
To: 'lpacey@wmmsgaming.com'; 'mblankstein@wmmsgaming.com'  
Subject: Draft

Larry and Michael,

I attach a draft patent application for the 3D-rendering gaming machine we discussed. I have bolded a couple sections where I proposed a couple concepts for consideration--these can be edited out or broadened. Please review this draft and contact me with any comments or additions.

I will fax rough drawings to your numbers at WMS. We will finalize these as formal drawings once everything is approved. If there is any artwork that you would like us to incorporate into the drawings, please let me know.

Best regards,  
Zach

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**Customer No. 30223**

**PATENT**  
**[47079-00134USPT]**

**APPLICATION FOR UNITED STATES LETTERS PATENT**

**for**

**GAMING MACHINE PERFORMING REAL-TIME 3D RENDERING OF  
GAMING EVENTS**

**by**

**Larry J. Pacey**

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# **GAMING MACHINE PROVIDING REAL-TIME 3D RENDERING OF GAMING EVENTS**

## **FIELD OF THE INVENTION**

5           The present invention relates generally to gaming machines, and, more particularly, to a gaming machine which provides real-time graphical rendering of gaming events.

## **BACKGROUND OF THE INVENTION**

10           Gaming machines, such as video slot machines, video poker machines, and the like, have been a cornerstone of the gaming industry for several years. Generally, the popularity of such machines with players is dependent upon a number of factors, including the likelihood (or perceived likelihood) of winning money at the machine or the intrinsic entertainment value of the machine relative to other available gaming  
15 options. In a modern casino, gaming machines compete with traditional styles of gaming (such as roulette, craps, and sports betting) for the attention of the player.

          Gaming machines traditionally have been developed for the play of such games as slots, poke, bingo, keno, and blackjack. These genres of gaming machines are well-known to the gaming public and have sizable markets of their own. Still,  
20 there are many players who will generally not play gaming machines, or who only play gaming machines in limited amounts. Such players may stay away from gaming machines for the reason that they believe the machines to be “fixed,” or destined to award small payoffs for wagers in comparison to other styles of gaming. Further, players may have grown attached to a certain style of gaming, such as sports betting or  
25 roulette, which is not accurately simulated by a gaming machine. In addition, traditional gaming machines only allow the player to wager on and interact with a limited amount of variables in an isolated interaction. Thus, gaming machines lack the appeal of interactions with real-world objects that other types of gaming allow.

          A solution is needed, therefore, to address the foregoing disadvantages.

30

## SUMMARY OF THE INVENTION

A gaming machine presents a rendered event upon which the player wagers, allowing the player to see the outcome of the event and the outcome of his wager in real time.

5        The above summary of the present invention is not intended to represent each embodiment, or every aspect, of the present invention. This is the purpose of the figures and the detailed description which follow.

## BRIEF DESCRIPTION OF THE DRAWINGS

10        The foregoing and other advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings.

FIG. 1 is an isometric view of a gaming machine according to one embodiment of the present invention;

FIG. 2 is a functional block diagram of a gaming machine according to the  
15        present invention;

FIG. 3 is a flow chart showing the process of a performance and outcome of a game according to one embodiment of the present invention;

FIG. 4 is a flow chart showing the process of a performance and outcome of a game according to another embodiment of the present invention; and

20        FIG. 5 is a screen view showing a gaming screen according to one embodiment of the present invention.

While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. It should be understood, however, that the  
25        invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

## DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

30        FIG. 1 shows an isometric view of a gaming device 10 according to one embodiment of the present invention. To use the gaming device 10, a player begins by inserting credits into the machine 10, for example through the use of a money acceptance slot 12 or a card reader 14. The player may then interact with control

inputs 16 to place various types of wagers, as will be described in more detail below. The control inputs 16 may include buttons, joysticks, a mouse, a keyboard, trackballs and/or other types of game control inputs. Further, the game machine 10 may incorporate a touch-screen control device.

5        Upon accepting a wager and any other input from a player, the gaming machine 10 displays game activity using a display 18, optionally in combination with audio output from speakers (not shown). Based on the outcome of the game activity, the gaming device may reward a player with a payoff via a coin chute 20 or by electronically awarding credits to the player. The gaming machine 10 may track  
10    player performance over time through the use of a player identification card reader 22, and may communicate with other gaming machines, servers, hosts, networks, or databases via a communication module 24.

FIG. 2 illustrates the interactions that take place within the gaming machine 10 as a functional block diagram. The central processing unit ("CPU") 26 coordinates  
15    game control signals and tracks wagers and payoffs, among other tasks. A money/credit detector 28 signals the central processing unit 26 when a player has inserted money or placed a wager. The money may be provided by coins, bills, tickets, coupons, cards, etc. The CPU 26 executes game instructions, causing the display 18 to give a visual representation of game activity. According to a preferred  
20    embodiment of the present invention, the display 18 is used to display two-dimensional images of three-dimensional simulation forms. To receive a wager, the CPU 26 may prompt a player for wagering selections to be input through the control inputs 16.

A system memory 30 stores control software, operational instructions and data  
25    associated with the gaming machine 10. In one embodiment, the system memory 30 comprises a separate read-only memory (ROM) and battery-backed random-access memory (RAM). However, it will be appreciated that the system memory 30 may be implemented on any of several alternative types of memory structures or may be implemented on a single memory structure. The system memory 30 may be  
30    augmented with information transmitted through the communication module 24, such that information outside of the gambling machine 10 may be incorporated into a simulation for a wagering experience. A payoff mechanism 32 is operable in response to instructions from the CPU 26 to award a payoff to the player in response to any

game outcomes that include a payoff. The payoff may, for example, be in the form of a number of credits. The payoff amount may be determined by pay tables or by game rules, as described more completely below. In some embodiments, the control inputs 16 may be used by the player for such actions as calling a casino attendant or for  
5 collecting any credits on the game's credit meter.

**[Include an embodiment where the payoff mechanism 32 responds to outcomes from the 3D processor, taking the CPU out of that loop?]**

A 3D processor 34 may be used in conjunction with the CPU 26 to facilitate computation required for the rendering of three-dimensional objects on the display 18.  
10 The 3D processor 34, the CPU 26, or the two working in conjunction can be used to implement a physics engine which realistically animates physical objects within a simulation world corresponding to a game. According to one embodiment, the 3D processor 34 performs all 3D processing, allowing the CPU 26 to perform other tasks. According to another embodiment, the 3D processor 34 handles specific 3D  
15 processing tasks only when the CPU 26 is overburdened with other processing tasks.

Turning now to FIG. 4, a flow chart shows the operation of a gaming machine 10 according to one embodiment of the present invention. In the embodiment of FIG. 4, the outcome of a game is simultaneously determined and displayed to the player. As shown at block 36, gaming begins when a player indicates a desire to place a  
20 wager. Next, as shown at block 38, the player makes a game play determination and/or directs the placement of the wager. For example, in a horse-racing embodiment of the present invention, the player could determine which horse to bet on at this stage, or set the type of wager—for example, win, place, or show—desired. Other embodiments of such decisions will be described in further detail below.

25 Next, as shown at block 40, the gaming machine creates a 3D, real-time simulation world within which game activities occur. In this context, the “world” may not be the entire world, but rather a physical domain within which game activities are performed. For example, if the gaming machine 10 is simulating a casino table game such as craps, the gaming “world” might consist of a bounded craps table and a pair of  
30 simulated dice. Similarly, a simulated world for use in a horse racing simulation might be quite large, encompassing an entire racing track along with several individual horses, each with a jockey. In a preferred embodiment, the simulation world is created by a combination of the CPU 26 and the 3D processor 34. For



example, the CPU 26 may access rules relating to a world from the system memory 30 and forward those rules to the 3D processor 34 for graphical rendering of the effects of the rules on graphical objects within a simulated world. Alternatively, the 3D processor 34 may be designed to run simulations within a simulated world with physical properties closely mimicking the real world, so that the same general rules, such as the effects of gravity or the results of collisions, can be carried out from game to game without any need to update the 3D processor with new rules for different game types. At this point, the 3D simulation world may be merely numerical in nature, with the 3D processor 34 of the CPU 26 using the numerical world information to form a geometric world which can be shown to the player via the display 18.

Next, as shown at block 42, a game outcome is determined and displayed in real time. In a real time determination and display embodiment, game activity is shown on the display 18 at the same time that the underlying mathematical basis for the displayed game activity is being calculated. Thus, the player is actually shown the events of the game as they are occurring. Such so-called “rendering on the fly” may allow a player to interact with a gaming machine 10 during the display of game activity to alter the game outcome. For example, in an interactive horse racing simulation, rendering the activity in real time can give the player a choice to speed up a horse during the final stretch or conserve the horse’s energy during the beginning and middle of a race. Likewise, in a simulated billiards game, the player may be allowed to make shot selections during the game that influence the game outcome. A player may further be given the opportunity to place new bets during the display of the simulated game or to alter current bets, with penalties where appropriate.

Next, at decision block 44, the game machine 10 determines whether the player has met winning conditions in the game. If one or more winning conditions are met, the player is rewarded with credits or money as shown at block 46. If no winning conditions are met, the player is given another opportunity to place a wager as shown at block 36.

As an example of a gaming experience on a gaming machine according to the embodiment of FIG. 3, a gaming machine featuring a horse race could simulate a race among four horses, each having a jockey. The system memory 30 of the gaming machine may be supplied with extensive information about each of the horses and

each of the jockeys. For example, the system memory 30 may contain information such as each jockey's weight and skill (which might be determined from a racing history), each horse's weight and skill (such as its winning percentage, stamina, or performance in races having different conditions), and the race conditions (such as muddy, sunny, hot or cold). The number and complexity of variables provided in the system memory 30 is limited only by the size of the system memory 30 and the capabilities of the CPU 26 and/or the 3D processor 34 to process the required data in a reasonable time. In the case of the real-time game outcome determination and display of FIG. 3, the CPU 26 and/or the 3D processor 34 must be capable of processing the required data at least quickly enough to display the game activity at a real-time pace.

Turning now to FIG. 4, a flow chart shows the logic of a gaming machine according to the present invention using an alternative method for the computation and display of game outcomes. The embodiment shown in FIG. 4 uses the underlying numerical basis for real-world simulations to carry out mathematical simulations internally, such that the simulation outcome is "known" to the gaming machine before the gaming activity is shown to the player. A gaming machine according to this embodiment may be useful to implement in casinos subject to jurisdictional rules prohibiting "on-the-fly" game determinations in gaming machines, because outcomes determining award payoffs are predetermined within the gaming machine.

As shown in FIG. 4, gaming according to this embodiment begins similarly to gaming according to the embodiment of FIG. 3, with the player placing a wager as shown at block 48 and making a game play determination and/or directing the wager as shown at block 50. The 3D simulation world and rules are created, shown at block 52. The simulation outcome is then determined mathematically, as shown at block 54, and a game outcome corresponding to the simulation is displayed, as shown at block 56. Next, the gaming machine determines whether a win condition has been met at decision block 58. If a win condition has been met, the player is rewarded as shown at block 60, and if no win condition is met, the player is given the opportunity to wager once again as shown at block 48. Similarly to the embodiment of FIG. 3, a player of the embodiment of FIG. 4 may be given the option to modify a wager during the display of game events, with possible penalties for such modifications. According to one embodiment of the present invention, a simulation outcome is compared to

possible wager outcomes to determine which of the wager outcomes either exactly or approximately best matches the simulation outcome.

A gaming machine according to the present invention may incorporate a hybrid of the embodiments shown in FIGS. 3 and 4, such that certain components of a simulation outcome are pre-computed but other components of game activity are  
5 computed and rendered in real time. For example, the winner of a four-horse race may be predetermined to be horse three, but during the race horses one, two, and four may appear to be headed for victory. The activity during the race may be altered from game to game to present the player with different visual experiences during multiple  
10 plays. Further, although the flow charts of FIGS. 3 and 4 show the creation of a 3D simulation world and rules following a wager, in an alternative embodiment the 3D simulation world and rules are pre-set such that this step may be skipped during individual game play sessions. It is to be understood that the principles of the present invention can be applied to a main game of a gaming machine or to a bonus game  
15 within a gaming machine.

According to one embodiment of the present invention, the mathematical basis of a gaming activity portrayed via a gaming machine 10 is based on real-world physics describing the interactions between physical objects. The mathematical basis for physical interactions between objects portrayed by a gaming machine 10 may be based  
20 on a readily available "physics engine" or program which is designed to realistically simulate a wide variety of physical phenomena, or separate underlying mathematical rules may be provided on a specialized basis for specific game actions to be simulated.

A variety of types of data may be used to simulate game activities in the present invention, as will be further understood from the examples which follow.  
25 Several general data types are particularly beneficial, as shown in the information flow chart of FIG. 5. FIG. 5 shows the combination of different types of data used by a gaming machine according to the present invention and ways in which the data may be manipulated by the CPU 26, the 3D processor 34, or a combination of the two. According to one embodiment of the present invention, physical object data 62,  
30 motion capture data 64, and simulation rule data 66 are used together, though it is to be understood that these types of data may be used in other combinations or alone. For example, according to some embodiments of the present invention, it may be

beneficial to combine physical object data 62 and simulation rule data 66 without any need for motion capture data 64.

Physical object data 62 may comprise a variety of types of information about physical objects whose motions and interactions are to be simulated. The mass, dimensions, elasticity, and center of gravity of a simulated object may be taken  
5 together or separately to comprise the physical object data 62. According to some embodiments of the present invention, a physical object may comprise several individually movable portions. Such an embodiment may be necessary in simulating a person, a car, or a horse. In these embodiments, physical object data may include  
10 information such as the dimensions of individual portions, the location of joints, the masses of individual body portions, the number of individual portions of the object, and the like.

Physical object data 62 may be used in combination with manual animation of simulated objects, or it may be combined with motion capture data 64. Further, a  
15 combination of motion capture data 64 and manual animation may be used to create more realistic or more stylized depictions of game activities. Motion capture data 64 includes data that is acquired from observation of physical objects, actors, or animals. Several techniques are available for capturing digital information on motion, including optical and electronic motion capture as is known in the field of computer animation.  
20 Using motion capture data in simulating a game activity according to the present invention helps to lend a realistic appearance to simulated real-world events, such that simulated objects appear to interact as they would in the real world. Motion capture data may be collected of a figure running, jumping, climbing, or performing any other motion effecting a result which could be wagered upon.

Simulation rule data 66 comprises a set of parameters describing how  
25 simulated objects should work together within a simulated environment to provide an entertaining activity for wagering. According to one embodiment of the present invention, the simulation rule data comprises rule data designed to mimic as closely as possible activities within the real world. For example, in a gaming machine designed  
30 to simulate a roulette game, the simulation world may comprise a roulette ball and a roulette wheel, and the rule data would specify the strength of gravity tending to pull the simulated roulette ball downward toward the wheel. Other rule data would include information on how the roulette ball interacts with the roulette table. In this

example, the rule data would interact with information on the mass, dimensions, and elasticity of the roulette ball and roulette table to enable a realistic simulation of the interaction of the roulette ball with the roulette wheel. A simulation world according to the present invention can encompass a variety of scopes, from the entire universe  
5 down to the modeling of a single object within a game world, such that anything that one would want to put a wager on could be simulated by a gaming machine according to the present invention.

According to one embodiment of the present invention, the simulation rule data 66 are designed such that they fit parameters defining certain outcomes desired  
10 by a game designer. For example, in the roulette embodiment discussed above, the game designer may force the simulation rule data 66, along with the physical object data 62, to present a one-in-thirty-eight chance that the roulette ball will fall next to any number in the roulette wheel. Following the determination of desired probabilities of specific outcomes, the physical object data 62 and simulation rule data  
15 66 can be developed either manually or automatically to cause the desired outcome probability distribution. **Further, the simulation rule data 66 may be modified using random values such that pre-defined organizations of physical objects do not repeatedly give the same gaming outcomes.** According to another embodiment of the present invention, the distribution of probabilities of simulated event outcomes  
20 is dependent solely upon the simulated physical world developed through an interaction between the physical object data 62 and the simulated rule data 66.

The simulated rule data 66 may be modified by bounds to control the possible wager outcomes of a gaming system according to the present invention. Further, according to one embodiment of the present invention, data relating to objects forming  
25 part of the simulation world, such as backgrounds and room dimensions, may be treated as physical object data, with the simulation rule data 66 providing the rules under which all simulated objects interact with each other and with forces within the simulated world. Visual depictions of simulated gaming activities may be shown at increased or decreased speeds in a forward or reverse direction for replays, and further  
30 the camera angle of the visual depictions may be altered to give the player an optimum view of the gaming activity.

The physical object data 62, motion capture data 64, and simulation rule data 66 may be stored in the system memory 30, which may be expanded over time or

updated through communication with the communication module 24. The data are used by the CPU 26 and/or the 3D processor 34, working together or separately, to produce a mathematical simulation of gaming activity as shown at block 68. The mathematical simulation forms the underlying basis for a graphical depiction of simulated activity as shown at block 70. The graphical depiction of simulated activity is displayed to the player so that the wager outcome 72 is known to the player.

Turning now to FIG. 6, a screen view is shown illustrating a horse racing embodiment of a wagering experience according to the present invention. In this embodiment, the player is presented with a number of physical gaming objects, including the horses 74, 76, and 78 and the jockeys 80, 82, and 84. Each of these objects may be modeled with physical object data 62 with respect to their weights, dimensions, and skill levels, and motion captured to portray realistic movement to the player. The horses race on a track 86, whose specifications may be contained within the simulation rule data 66. Track specifications may include the type of track (gravel, sand, grass, etc.), the weather conditions of the track, and other factors. Further, environmental effects such as wind or rain may be modeled within the simulation rule data 66, with these parameters affecting race outcomes. Other track items, such as bushes 88, may be modeled and may interact with the horses and jockeys, thereby affecting the race outcome. The overall effect of mathematically modeling pertinent elements of the horse race is to present a realistic race outcome to the player, thereby increasing the player's interest in continued wagering.

The screen shown in FIG. 6 shows that the six-horse 78 is leading the race and about to cross the finish line 90 first. This result may have arisen as a result of several events earlier in the race, which have already been realistically mathematically simulated and graphically presented to the player. For example, the three-horse 76 may have expended too much energy early in the race, falling behind in the final stretch. The four-horse 74 may not have been driven hard enough by its jockey 80 and therefore not expended the energy necessary to win the race. Further, horses not shown may have collided during the race, taking them out of contention. According to one embodiment of the present invention, tendencies such as these are modeled and preserved from game to game, such that a player may grow accustomed to the performance of certain horses and jockeys and posit predictions as to how a race will conclude. Thus, the game objects may be persistent mathematical models which stay

the same over time or change slightly, just as real-world objects would. Game objects such as horses and jockeys may also be transferred between game machines, behaving as mathematical “objects” and being acted upon by similar forces in other game machines.

5           The present invention may be used to model any objects or events used for wagering purposes. For example, physical object data 62 may include data on playing cards and the simulation rule data 66 may include information describing how shuffling affects the cards, or how a table surface affects the cards as the cards are dealt. The principles of the present invention may be applied to a variety of gaming  
10 events, including but not limited to vehicle races, casino table games such as roulette, wheel of fortune, craps, and card games, and sporting events such as baseball, football, basketball, and hockey games.

          According to one embodiment of the present invention, mathematical modeling and graphical depictions are used to model and display an entire sports  
15 season, providing players with the ability to wager on every game in a simulated season and to wager on season-long outcomes as well. According to another embodiment of the present invention, a player may invest in a mathematically modeled sports participant, team, or automobile in much the same way that real-world team owners invest in these entities. Having the three-dimensional model preserved  
20 throughout a simulated season, a player’s fortunes may rise and fall in conjunction with the interaction of these simulated objects with simulation worlds and rules, while viewing game activities as a realistic depiction of three-dimensional action. Such gaming may take place in a simulated gaming “arena” with large screens showing gaming activities and individual player kiosks or remote controls for the input of  
25 wagering information.

          While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof is contemplated as falling  
30 within the spirit and scope of the claimed invention, which is set forth in the following claims.

## WHAT IS CLAIMED IS:

1. A gaming machine comprising:  
means for receiving a wager;  
5 a system memory containing physical object data and simulation rule data;  
a display;  
a central processor for processing said physical object data and said simulation  
world data to produce a realistic depiction of gaming activity on said display; and  
means for awarding a payoff based on an outcome of said gaming activity.  
10
2. The gaming machine of claim 1 further comprising a 3D processor interacting  
with said central processor to facilitate the production of said real-world gaming  
activity on said display.
- 15 3. The gaming machine of claim 1 where said physical object data includes data  
relating to the mass and dimensions of at least one simulated object.
4. The gaming machine of claim 1 wherein said simulation rule data includes  
data relating to a simulated gaming world and data relating to rules for interaction  
20 between said physical object data and said simulated gaming world data.
5. The gaming machine of claim 4 wherein said gaming machine is adapted to  
display three-dimensional simulations of gaming activities.
- 25 6. The gaming machine of claim 1 wherein said processor is adapted to firstly use  
said physical object data and said simulation rule data to mathematically model said  
gaming activity and to secondly enable the display of said realistic depiction on said  
display.
- 30 7. The gaming machine of claim 1 wherein said gaming activity is a sport and  
said physical object data relates to one or more participants in said sport.
8. A method of operating a gaming machine comprising:



- accepting a wager;  
accessing physical object data;  
accessing simulation rule data;  
mathematically modeling game actions of one or more physical objects within  
5 a simulation world using said physical object data and said simulation rule data;  
displaying a visual depiction of said game actions;  
determining if said game actions meet winning conditions; and  
awarding a payoff if said game actions meet winning conditions.
- 10 9. The method of claim 8 further comprising accessing motion capture data and  
using said motion capture data while displaying said visual depiction.
10. The method of claim 8 wherein mathematically modeling game actions  
includes mathematically modeling sports actions.
- 15 11. The method of claim 8 wherein mathematically modeling game actions  
comprises applying said simulation rule data to said physical object data to result in a  
realistic mathematical model of real-world physical object interactions.
- 20 12. The method of claim 8 further comprising defining said physical object data by  
mathematically representing physical qualities of real-world objects.
13. The method of claim 12 further comprising defining said simulation world  
data by mathematically representing real-world physical principles.
- 25 14. The method of claim 8 further comprising computationally altering said game  
actions to cause predefined probabilities of certain game actions.
15. A method of operating a gaming machine comprising:  
30 accepting a wager;  
simultaneously simulating and displaying in real time an interaction of  
simulated physical objects using a representation of three-dimensional forms;  
determining an outcome of said interaction; and

awarding a payoff if said outcome meets winning criteria.

16. The method of claim 15 wherein simultaneously simulating and displaying an interaction of physical objects comprises using simulation rule data to determine an  
5 interaction of simulated physical objects modeled using physical object data.

17. The method of claim 15 further comprising comparing said outcome of said interaction to a set of predefined outcomes to determination of whether said outcome meets winning criteria.

10

18. The method of claim 15 wherein simultaneously simulating and displaying said interaction comprises implementing a physics engine with a combination of a central processing unit and a 3D processor.

15 19. The method of claim 18 wherein simultaneously simulating and displaying said interaction comprises simulating and displaying a casino-style game selected from the group consisting of roulette, craps, slots, cards, and wheel of fortune.

20 20. The method of claim 18 wherein simultaneously simulating and displaying said interaction comprises simulating and displaying a sports game.

21. The method of claim 20 wherein said sports game is selected from the group consisting of baseball, basketball, soccer, hockey, football, bowling, and racing.

25 22. A method of operating a gaming machine comprising:  
accepting a wager;  
implementing a physics engine using physical object data and simulation rule data to numerically simulate an interaction of physical objects, thereby creating a simulated interaction;  
30 rendering a visual display of said simulated interaction using a two-dimensional representation of three-dimensional forms;  
determining an outcome of said interaction; and  
awarding a payoff if said outcome meets winning criteria.

## ABSTRACT

A gaming machine uses mathematical modeling and graphical displays to provide players with realistic depictions of gaming activities for wagering. Three-dimensional mathematical models are used to simulate real-world interactions of physical objects, with a display showing the player a visual representation of the game interactions. By providing the player with a realistic depiction of real-world gaming activities, a gaming machine according to the present invention involves the player in the wagered-upon activity to a greater extent than traditional gaming machines.

-----Original Message-----

From: Blankstein, Michael

Sent: Thursday, April 18, 2002 9:41 AM

To: 'zsmolinski@jenkens.com'

Cc: 'dburnham@jenkens.com'

Subject: real time 3D application

Zach, attached are my minor changes made with the "track changes" tool of Word. You can wait to send a revised version to Larry until after you receive his changes, if any.

You did a very nice job.

Michael